

REMARKS/ARGUMENTS

Favorable reconsideration of this application, in light of the present amendments and following discussion, is respectfully requested.

Claims 1-22 are pending. Claims 1 and 14 are amended. Claims 16-22 are newly added. Support for the amendment to Claims 1 and 14 can be found in numbered paragraph [0087] of the published application, for example. Support for newly added dependent Claims 16-18 and 20 can be found in numbered paragraphs [0037]-[0040], [0045], and [0103]-[0107] of the published application, for example. Support for newly added dependent Claims 19 and 21 can be found in numbered paragraphs [0065] and [0087] and Figs. 5 and 7, for example. Support for newly added independent Claim 22 (which is similar to original Claim 1, but with the sintering and diffusion welding steps placed in order) can be found in original Claim 1 and in numbered paragraphs [0037]-[0040], [0045], and [0103]-[0107], for example. No new matter is added.

In the outstanding Office Action, Claims 1, 2, 4-6, 8, 9, 11, and 14 were rejected under 35 U.S.C. §102(a) as anticipated by Buldhaupt et al. (U.S. Patent No. 6,419,146, herein "Buldhaupt"). Claims 1, 2, 4-6, 11, and 14 were rejected under 35 U.S.C. §102(b) as anticipated by Will et al. (U.S. Patent No. 6,138,898, herein "Will"). Claims 7, 12, and 15 were rejected under 35 U.S.C. §103(a) as obvious over Buldhaupt. Claims 3, 10, 12, 13, and 15 were rejected under 35 U.S.C. §103(a) as obvious over Buldhaupt in view of Sanders (U.S. Patent Pub. 2002/0179688) in view of Weisert et al. (U.S. Patent No. 4,220,276, herein "Weisert").

Applicants note with appreciation the courtesy of a telephone interview granted by Examiners Michael Aboagye and Johnathan Johnson to Applicants' representative on February 13, 2007. During the telephone interview conducted on February 13, 2007, the Examiners suggested adding further description of the localized sintering process. One

suggestion was to clarify that sintering does not include melting of the powder, which is required in the welding processes described in each of Buldhaupt and Will. Accordingly, independent Claims 1 and 14 are amended in accordance with the language suggested by the Examiner as discussed below.<sup>1</sup>

Regarding the rejection of Claim 1 as anticipated by Buldhaupt, that rejection is respectfully traversed by the present response. Independent Claim 1 recites, in part:

- b1) applying a layer of anti-diffusion substance comprising a powder over the entire surface of said at least one face of the primary parts;
- b2) localized sintering of the anti-diffusion substance, **without melting the powder**, in said predefined pattern by the heating that results from localized application of a laser beam along a track made up of at least one zone, thereby producing, in said at least one zone, both bonds between the particles of powder and also a diffusion phenomenon between the particles of powder and the material of said at least one face of the primary part; and
- b3) removing the anti-diffusion substance from the regions that are not subjected to the laser beam.

Independent Claim 1 also recites:

- c) assembling said primary parts together at their said periphery...
- d) diffusion welding the stack under isostatic pressure.

The anti-diffusion substance is sintered by localized application of a laser beam. The sintering is performed **without melting the powder**. The stack of parts is assembled and welded.

The outstanding Office Action points to Buldhaupt, col. 4, line 43-col. 6; line 22, col. 7, lines 40-66; and col. 8, line 33-col. 9, line 19, for the above-noted features, and the outstanding Office Action emphasizes col. 5, lines 40-54, in the response to arguments section, as supporting the assertion that Buldhaupt describes laser sintering a "stop-off"

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<sup>1</sup> In conjunction with the Interview Summary provided by Examiners Aboagye and Johnson, the substance of the telephone interview conducted on February 13, 2007, is provided herein in accordance with MPEP § 713.04

material.<sup>2</sup> The outstanding Office Action also asserts that Buldhaupt does not teach that the stop-off is kept away from the laser.<sup>3</sup> The outstanding Office Action relies on the laser welding of the parts for two features of Claim 1, i) the localized sintering by laser beam and ii) the welding of the parts.

The section of Buldhaupt emphasized in the outstanding Office Action states:

When curved panels are being made, it may be desirable to coat one side of one of the core sheets 44 and 46 with a stop-off compound such as boron nitride to prevent unintended diffusion bonding. For large area surfaces, the boron nitride may be dissolved in a solvent such as a mixture of water and alcohol and sprayed with an electrostatic sprayer onto the entire surface area of the one side of the one sheet. The water and alcohol evaporate, leaving a thin even coating of boron nitride on the surface of the titanium sheet. For smaller surfaces, the stop-off may be sprayed from an aerosol can of a solution of boron nitride in an alcohol solution that is commercially available from the Cerac Company in Milwaukee, Wisconsin. The stop-off, if used, is carefully excluded from the region between the sheets 44 and 46 where the hardpoint 40 is to be, since diffusion bonding in that area is desired.

The coated sheet is aligned with and abutted against the other sheet, with the boron nitride coated face facing the other sheet. The two core sheets 44 and 46 are laser welded in the pattern shown in FIGS. 2 and 4 on a laser welding apparatus shown in FIGS. 6A and 6B, purchased from Convergent Energy Corp. in Sturbridge, Mass. The apparatus 59 includes a CNC motion control table 60 on which the sheets 44 and 46 are placed and secured in an 2 aligned stack. A vertically extendable clamping actuator such as a powered plunger is mounted over the table 60. The plunger has a fitting on which a pressure trolley 62, shown in more detail in FIGS. 7 and 8, is mounted for exerting a vertical force on the sheets to press them into intimate contact during laser welding by a laser beam aimed vertically downward through the center of the trolley 62 at the table.<sup>4</sup>

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<sup>2</sup> Outstanding Office Action, pages 2 and 5.

<sup>3</sup> Outstanding Office Action, page 5.

<sup>4</sup> Buldhaupt, col. 5, lines 24-54.

Applicants respectfully submit that as the core sheets (44) and (46) are laser welded, and the outstanding Office Action asserts that the stop-off material used in Buldhaupt is sintered when the laser welding occurs,<sup>5</sup> Buldhaupt melts any stop-off material affected by the laser.

Applicants respectfully submit that any welding of the stack in a place on which the stop-off material is deposited will necessarily melt the stop-off material as is the understood definition of the term "welding." In other words, either the stop-off material is not bonded by a laser in any way whatsoever and Buldhaupt fails to disclose this feature of Claim 1,<sup>6</sup> or the stop-off material is only affected by the laser during welding and is therefore is melted.<sup>7</sup> The stop-off material is in no case **sintered without melting** as recited in amended independent Claim 1. Accordingly, Applicants respectfully submit that amended independent Claim 1 and Claims 2, 4-6, 8, 9, and 11 depending therefrom patentably distinguish over Buldhaupt for at least the reasons discussed above. Additionally, Applicants respectfully submit that Claims 7 and 12 depending from amended independent Claim 1 also patentably distinguish over Buldhaupt, and the rejection of Claims 7 and 12 under 35 U.S.C. § 103(a) as obvious over Buldhaupt is overcome.

Amended independent Claim 14 recites substantially similar features to those discussed above regarding amended independent Claim 1 and the rejection over Buldhaupt. Accordingly, Applicants respectfully submit that amended independent Claim 14 and Claim 15 depending therefrom patentably distinguish over Buldhaupt for at least the same reasons as amended independent Claim 1.

Regarding the rejection of Claims 1, 2, 4-6, 11, and 14 as anticipated by Will, that rejection is respectfully traversed by the present response.

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<sup>5</sup> Outstanding Office Action, page 2.

<sup>6</sup> As asserted in the previous response inasmuch as the stop-off is kept away from the areas to be welded.

<sup>7</sup> As asserted in the outstanding Office Action.

As discussed above, amended independent Claim 1 recites that the localized sintering of the anti-diffusion substance occurs without melting the powder of the anti-diffusion substance.

The outstanding Office Action asserts the stop-off substance described in Will is locally sintered by a laser **during** diffusion welding of a stack.<sup>8</sup> However, by definition, the welding of the stack creates melting. Accordingly, Will fails to teach or suggest localized sintering of an anti-diffusion substance **without melting the powder** of the anti-diffusion substance as recited in amended independent Claim 1. Accordingly, Applicants respectfully submit that amended independent Claim 1 and Claims 2, 4-6, and 11 depending therefrom patentably distinguish over Will for at least the reasons discussed above. Amended independent Claim 14 recites substantially similar features to those discussed above regarding amended independent Claim 1 and patentably distinguishes over Will for at least the same reasons as amended independent Claim 1 does.

Regarding the rejection of dependent Claims 3, 10, 12, 13, and 15 as obvious over Buldhaupt in view of Sanders and Weisert, that rejection is respectfully traversed by the present response.

Claims 3, 10, 12, 13, and 15 each depend from one of amended independent Claims 1 and 14 and patentably distinguish over each of Buldhaupt and Will for at least the same reasons as amended independent Claims 1 and 14 do.

The outstanding Office Action relies on Sanders and Weisert for specific materials used in the anti-diffusion substance or for the particle size of the anti-diffusion substance.<sup>9</sup>

However, Applicants respectfully submit that neither of Sanders and Weisert teaches or suggests localized sintering of an anti-diffusion substance by application of a laser without melting a powder comprising the anti-diffusion substance as recited in amended independent

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<sup>8</sup> Outstanding Office Action, page 2-3 citing Will, col. 6, lines 15-48.

<sup>9</sup> Outstanding Office Action, page 5.

Claims 1 and 14. Accordingly, Applicants respectfully submit that dependent Claims 3, 10, 12, 13, and 15 each patentably distinguish over any proper combination of Buldhaupt, Sanders, and Weisert for at least the above-discussed reasons.

Newly added dependent Claims 16 and 20 recite that the localized sintering of the anti-diffusion substance occurs **before** the diffusion welding of the stack under isostatic pressure.

Accordingly, as the outstanding Office Action asserts that both of Buldhaupt and Will provide sintering of a stop-off material **during** the process of welding the stacks of metal together, neither of Buldhaupt and Will teaches or suggests sintering of their stop-off materials before the welding. Accordingly, Applicants respectfully submit that newly added dependent Claims 16 and 20 further patentably distinguish over the cited references for at least the reasons discussed above.

Newly added dependent Claim 18 recites that the localized sintering of the anti-diffusion substance occurs before assembly of the primary parts.

As the outstanding Office Action asserts that each of Buldhaupt and Will sinters the material during welding of the primary parts, neither of Buldhaupt and Will teaches or suggests sintering of anti-diffusion substance before assembly of the primary parts inasmuch as the primary part must be assembled before they can be welded together. Accordingly, newly added dependent Claim 18 further patentably distinguishes over any proper combination of the cited references for at least the reasons discussed above.

Newly added dependent Claims 19 and 21 recite that the localized sintering is performed by application of the laser directly to the anti-diffusion substance.

The outstanding Office Action asserts that each of Buldhaupt and Will performs sintering when the parts to be welded are welded together. As is clear from each of Buldhaupt and Will, the laser is applied to a surface of the parts to be welded **external** to any

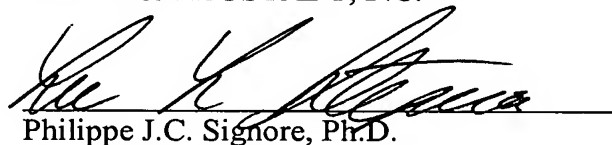
surface including stop-off material. In other words, a laser is applied to an outside surface of a stack of materials, and the stop-off substance is applied to an interior surface of the stack of materials, and welding occurs in the interior surface. The laser does not act directly on the anti-diffusion substance. Accordingly, Applicants respectfully submit that newly added dependent Claims 19 and 21 further patentably distinguish over any proper combination of the cited references for at least the above-discussed reasons.

Newly added independent Claim 22 recites the features of previous Claim 1, but also recites that the diffusion welding is performed after the localized sintering of the anti-diffusion substance. Thus, the cited references, which are asserted to sinter anti-diffusion substance and weld component parts at the same time, fail to teach or suggest all of the features of newly added independent Claim 22.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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